

CLAIMS

Therefore, having thus described the invention, at least the following is claimed:

1. A digital subscriber line access multiplexer, comprising:
 - 5 a. a means for receiving a plurality of data communications channels;
 - b. a means for receiving a plurality of digital subscriber line communications channels; and
 - c. a means for automatically configuring a plurality of cross-connects between the plurality of data communications channels and the plurality of digital subscriber line communications channels.
- 10 2. The multiplexer of claim 1, wherein the plurality of data communications channels and the plurality of digital subscriber communications channels are adapted to carry asynchronous transfer mode traffic.
- 15 3. The multiplexer of claim 2, wherein the means for automatically configuring a plurality of cross-connects comprises:
 - a. a means for obtaining a default logical VPI/VCI address associated with the plurality of data communications channels;
 - 20 b. a means for defining a first plurality of unique logical VPI/VCI addresses based on a predefined set of rules for incrementing logical VPI/VCI addresses, each of the first plurality of unique logical VPI/VCI addresses associated with one of the plurality of digital subscriber line communications channels;
 - c. a means for determining a second plurality of unique logical VPI/VCI addresses based on the default logical VPI/VCI address and the predefined set of rules;
 - 25 and
 - d. a means for creating signal connectivity between the plurality of data communications channels and the plurality of digital subscriber line channels by linking the first and second unique logical VPI/VCI addresses.

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4. The multiplexer of claim 3, wherein each of the plurality of cross-connects are defined as being in an autodown state.

5. The multiplexer of claim 4, further comprising a means for detecting a line card
5 having a plurality of digital subscriber line ports, each of the plurality of digital subscriber line ports associated with one of a portion of the plurality of digital subscriber line channels and receiving information associated with the line card.

6. The multiplexer of claim 5, wherein the information relates to (i) a slot number
10 corresponding to the line card, (ii) the number of digital subscriber line ports associated with the line card, (iii) the number of types of channels associated with each of the plurality of digital subscriber line ports, which defines the number of cross-connects corresponding to each of the plurality of digital subscriber line ports, and (iv) traffic profile information related to each of the types of channels.

15 7. The multiplexer of claim 6, further comprising a means for specifying one of the first and second plurality of unique logical VPI/VCI addresses as a base logical VPI/VCI address for each of the types of channels based on the information.

20 8. The multiplexer of claim 7, further comprising a means for associating each type of channel for each digital subscriber line port with one of the first plurality of unique logical VPI/VCI addresses.

25 9. The multiplexer of claim 8, further comprising a means for changing each of the plurality of cross-connects corresponding to each of the first plurality of unique logical VPI/VCI addresses associated with each type of channel for each digital subscriber line port to an up state.

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10. The multiplexer of claim 9, further comprising a means for controlling the type of data traffic carried on each of the plurality of cross-connects corresponding to each of the first plurality of unique logical VPI/VCI addresses associated with each type of channel for each subscriber line port based on the traffic profile information for each of the types of channels.

11. A digital subscriber line access multiplexer for providing signal connectivity between a plurality of digital subscriber line channels and a plurality of data communications channels, each of the plurality of data communications channels and the plurality of digital subscriber communications channels adapted to carry asynchronous transfer mode traffic, comprising:

a. a plurality of line cards, each line card having a plurality of digital subscriber line ports, each of the plurality of digital subscriber line ports capable of carrying a plurality of channels and adapted to communicate with one of the plurality of digital subscriber line channels;

b. a backplane interface having a first plurality of virtual circuit links, each of the first plurality of virtual circuit links adapted to communicate with each of the plurality of channels on each of the plurality of digital subscriber line ports;

c. an uplink interface having a second plurality of virtual circuit links, each of the second plurality of virtual circuit links adapted to communicate with one of the plurality of data communications channels; and

d. a switch concentration module for automatically configuring a plurality of cross-connects between the first and second plurality of virtual circuit links.

12. The multiplexer of claim 11, wherein the switch concentration module comprises:

a. memory containing instructions for automatically configuring the plurality of cross-connects and adapted to receive information from the uplink interface and the backplane interface;

5 b. a computer processing unit for implementing the instructions and controlling receipt of the information from the uplink interface and the backplane interface; and

c. a local interface connecting the computer processing unit, the memory, the uplink interface, and the backplane interface.

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13. The multiplexer of claim 12, wherein the instructions instruct the central processing unit to (i) obtain a default logical VPI/VCI address associated with the plurality of data communications channels on the uplink interface, (ii) define a first plurality of unique logical VPI/VCI addresses based on a predefined set of rules for
15 incrementing logical VPI/VCI addresses, each of the first plurality of unique logical VPI/VCI addresses associated with one of the plurality of digital subscriber line communications channels on the backplane interface, (iii) determine a second plurality of unique logical VPI/VCI addresses based on the default logical VPI/VCI address and the predefined set of rules, and (iv) create a plurality of cross-connects between the plurality
20 of data communications channels and the plurality of digital subscriber line channels by linking the first and second unique logical VPI/VCI addresses.

14. The multiplexer of claim 13, wherein each of the plurality of cross-connects are defined as being in an autodown state.

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15. The multiplexer of claim 14, wherein the instructions further instruct the central processing unit to (i) detect a line card having a plurality of digital subscriber line ports, each of the plurality of digital subscriber line ports associated with one of a portion of the plurality of digital subscriber line channels and (ii) receive information associated with
30 the line card.

16. The multiplexer of claim 15, wherein the information relates to (i) a slot number corresponding to the line card, (ii) the number of digital subscriber line ports associated with the line card, (iii) the number of types of channels associated with each of the plurality of digital subscriber line ports, which defines the number of cross connects
5 corresponding to each of the plurality of digital subscriber line ports, and (iv) traffic profile information related to each of the types of channels.

17. The multiplexer of claim 16, wherein the instructions further instruct the central processing unit to specifying one of the first and second plurality of unique logical
10 VPI/VCI addresses as a base logical VPI/VCI address for each of the types of channels based on the information.

18. The multiplexer of claim 17, wherein the instructions further instruct the central processing unit to associate each type of channel for each digital subscriber line port with
15 one of the first plurality of unique logical VPI/VCI addresses.

19. The multiplexer of claim 18, wherein the instructions further instruct the central processing unit to change each of the plurality of cross-connects corresponding to each of the first plurality of unique logical VPI/VCI addresses associated with each type of
20 channel for each digital subscriber line port to a up state.

20. The multiplexer of claim 19, wherein the instructions further instruct the central processing unit to control the type of data traffic carried on each of the plurality of cross-connects corresponding to each of the first plurality of unique VPI/VCI pairs associated
25 with each type of channel for each subscriber line port based on the traffic profile information related to each of the types of channels.

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21. A method for providing signal connectivity between a plurality of digital subscriber line channels and a plurality of data communications channels, each of the plurality of digital subscriber line channels and each of the plurality of data communications channels adapted to carry asynchronous transfer mode data, the method comprising:

- a. receiving the plurality of data communications channels;
- b. receiving the plurality of digital subscriber line communications channels; and
- c. automatically configuring a plurality of asynchronous transfer mode cross-connects between the plurality of data communications channels and the plurality of digital subscriber line communications channels.

22. A method for automatically configuring a plurality of cross connects in a digital subscriber line access multiplexer between a plurality of digital subscriber line channels and a plurality of data communications channels, the method comprising:

- a. obtaining a default logical VPI/VCI address associated with the plurality of data communications channels;
- b. defining a first plurality of unique logical VPI/VCI addresses based on a predefined set of rules for incrementing logical VPI/VCI addresses, each of the first plurality of unique logical VPI/VCI addresses associated with one of the plurality of digital subscriber line communications channels;
- c. determining a second plurality of unique logical VPI/VCI addresses based on the default logical VPI/VCI address and the predefined set of rules;
- d. creating a plurality of cross-connects between the plurality of data communications channels and the plurality of digital subscriber line channels by linking the first and second unique logical VPI/VCI addresses.

23. The method of claim 22, wherein each of the plurality of cross-connects are defined as being in an autodown state.

24. The method of claim 23, further comprising detecting a line card having a plurality of digital subscriber line ports, each of the plurality of digital subscriber line ports associated with one of a portion of the plurality of digital subscriber line channels and receiving information associated with the line card.

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25. The method of claim 24, wherein the information relates to (i) a slot number corresponding to the line card, (ii) the number of digital subscriber line ports associated with the line card, (iii) the number of types of channels associated with each of the plurality of digital subscriber line ports, which defines the number of cross connects
10 corresponding to each of the plurality of digital subscriber line ports, and (iv) traffic profile information related to each of the types of channels.

26. The method of claim 25, further comprising specifying one of the first and second plurality of unique logical VPI/VCI addresses as a base logical VPI/VCI address for each
15 of the types of channels based on the information.

27. The method of claim 26, further comprising associating each type of channel for each digital subscriber line port with one of the first plurality of unique logical VPI/VCI addresses.

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28. The method of claim 27, further comprising changing each of the plurality of cross-connects corresponding to each of the first plurality of unique logical VPI/VCI addresses associated with each type of channel for each digital subscriber line port to an up state.

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29. The method of claim 28, further comprising controlling the type of data traffic carried on each of the plurality of cross-connects corresponding to each of the first plurality of unique VPI/VCI pairs associated with each type of channel for each subscriber line port based on the traffic profile information related to each of the types of
30 channels.

30. A computer-readable medium having a computer program for use by a digital subscriber line access multiplexer for automatically configuring a plurality of cross-connects between a plurality of data communications channels and a plurality of digital subscriber line communications channels, the computer-readable medium comprising:

- 5 a. a first portion of code for obtaining a default logical VPI/VCI address associated with the plurality of data communications channels
- b. a second portion of code for defining a first plurality of unique logical VPI/VCI addresses based on a predefined set of rules for incrementing logical VPI/VCI addresses, each of the first plurality of unique logical VPI/VCI addresses associated with
- 10 one of the plurality of digital subscriber line communications channels;
- c. a third portion of code for determining a second plurality of unique logical VPI/VCI addresses based on the default logical VPI/VCI address and the predefined set of rules; and
- d. a fourth portion of code for creating a plurality of cross-connects between
- 15 the plurality of data communications channels and the plurality of digital subscriber line channels by linking the first and second unique logical VPI/VCI addresses.

31. The computer-readable medium of claim 30, wherein each of the plurality of cross-connects are defined as being in an autodown state.

32. The computer-readable medium of claim 31, further comprising a fifth portion of code for detecting a line card having a plurality of digital subscriber line ports, each of the plurality of digital subscriber line ports associated with one of a portion of the plurality of digital subscriber line channels and receiving information associated with the line card.

33. The computer-readable medium of claim 32, wherein the information relates to (i) a slot number corresponding to the line card, (ii) the number of digital subscriber line ports associated with the line card, (iii) the number of types of channels associated with each of the plurality of digital subscriber line ports, which defines the number of cross connects corresponding to each of the plurality of digital subscriber line ports, and (iv) traffic profile information related to each of the types of channels.

34. The computer-readable medium of claim 33, further comprising a sixth portion of code for specifying one of the first and second plurality of unique logical VPI/VCI addresses as a base logical VPI/VCI address for each of the types of channels based on the information.

35. The computer-readable medium of claim 34, further comprising a seventh portion of code for associating each type of channel for each digital subscriber line port with one of the first plurality of unique logical VPI/VCI addresses.

36. The computer-readable medium of claim 35, further comprising an eighth portion of code for changing each of the plurality of cross-connects corresponding to each of the first plurality of unique logical VPI/VCI addresses associated with each type of channel for each digital subscriber line port to an up state.

37. The computer-readable medium of claim 36, further comprising a ninth portion of code for controlling the type of data traffic carried on each of the plurality of cross-connects corresponding to each of the first plurality of unique VPI/VCI pairs associated with each type of channel for each subscriber line port based on the traffic profile information related to each of the types of channels.

38. An ATM switch, comprising:

- a. a means for receiving a plurality of network-side communications channels;
- b. a means for receiving a plurality of user-side communications channels;

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- c. a means for automatically configuring a plurality of cross-connects between the plurality of network-side communications channels and the plurality of user-side communications channels.

10 39. The switch of claim 38, wherein the means for automatically configuring a plurality of cross-connects comprises:

- a. a means for obtaining a default logical VPI/VCI address associated with the plurality of network-side communications channels;

- b. a means for defining a first plurality of unique logical VPI/VCI addresses based on a predefined set of rules for incrementing logical VPI/VCI addresses, each of the first plurality of unique logical VPI/VCI addresses associated with one of the plurality of user-side communications channels;

- c. a means for determining a second plurality of unique logical VPI/VCI addresses based on the default logical VPI/VCI address and the predefined set of rules;

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- d. a means for creating signal connectivity between the plurality of network-side communications channels and the plurality of user-side communications channels by linking the first and second unique logical VPI/VCI addresses.

25 40. The switch of claim 39, wherein each of the plurality of cross-connects are defined as being in an autodown state.

41. The switch of claim 40, further comprising a means for detecting a user port, the user port associated with one of a portion of the plurality of user-side communications channels.

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42. The switch of claim 41, further comprising a means for specifying one of the first and second plurality of unique logical VPI/VCI addresses as a base logical VPI/VCI address for each of a plurality of types of channels.

5 43. The switch of claim 42, further comprising a means for associating each type of channel for the user port with one of the first plurality of unique logical VPI/VCI addresses.

44. The switch of claim 43, further comprising a means for changing each of the
10 plurality of cross-connects corresponding to each of the first plurality of unique logical VPI/VCI addresses associated with each type of channel for the user port to an up state.

45. An ATM switch for providing signal connectivity between a plurality of network-
side communications channels and a plurality of user-side communications channels,
15 comprising:

- a. a plurality of user ports, each of the plurality of user ports capable of carrying a plurality of channels and adapted to communicate with one of the plurality of user-side communications channels;
- b. a backplane interface having a first plurality of virtual circuit links, each of
20 the first plurality of virtual circuit links adapted to communicate with each of the plurality of channels on each of the plurality of user ports;
- c. an uplink interface having a second plurality of virtual circuit links, each of the second plurality of virtual circuit links adapted to communicate with one of the plurality of network-side communications channels; and
- 25 d. a switch concentration module for automatically configuring a plurality of cross-connects between the first and second plurality of virtual circuit links.

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46. The switch of claim 45 wherein the switch concentration module comprises:

a. memory containing instructions for automatically configuring the plurality of cross-connects and adapted to receive information from the uplink interface and the backplane interface;

5 b. a computer processing unit for implementing the instructions and controlling receipt of the information from the uplink interface and the backplane interface; and

c. a local interface connecting the computer processing unit, the memory, the uplink interface, and the backplane interface.

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47. The switch of claim 12 wherein the instructions instruct the central processing unit to (i) obtain a default logical VPI/VCI address associated with the plurality of data communications channels on the uplink interface, (ii) define a first plurality of unique logical VPI/VCI addresses based on a predefined set of rules for incrementing logical
15 VPI/VCI addresses, each of the first plurality of unique logical VPI/VCI addresses associated with one of the plurality of user-side communications channels on the backplane interface, (iii) determine a second plurality of unique logical VPI/VCI addresses based on the default logical VPI/VCI address and the predefined set of rules, and (iv) create a plurality of cross-connects between the plurality of network-side
20 communications channels and the plurality of user-side communications channels by linking the first and second unique logical VPI/VCI addresses.

48. The switch of claim 47 wherein each of the plurality of cross-connects are defined as being in an autodown state.

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49. The switch of claim 48, wherein the instructions further instruct the central processing unit to specify one of the first and second plurality of unique logical VPI/VCI addresses as a base logical VPI/VCI address for each of the types of channels.

50. The switch of claim 49, wherein the instructions further instruct the central processing unit to associate each type of channel for each user port with one of the first plurality of unique logical VPI/VCI addresses.

5 51. The switch of claim 50, wherein the instructions further instruct the central processing unit to change each of the plurality of cross-connects corresponding to each of the first plurality of unique logical VPI/VCI addresses associated with each type of channel for each user port to an up state.

10 52. A method for providing signal connectivity between a plurality of user-side communications channels and a plurality of network-side communications channels, each of the plurality of user-side communications channels and each of the plurality of network-side communications channels adapted to carry asynchronous transfer mode data, the method comprising:

- 15 a. receiving the plurality of network-side communications channels;
- b. receiving the plurality of user-side communications channels; and
- c. automatically configuring a plurality of asynchronous transfer mode cross-connects between the plurality of network-side communications channels and the plurality of user-side communications channels.

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53. A method for automatically configuring a plurality of cross-connects in an ATM switch between a plurality of network-side communications channels and a plurality of user-side communications channels, the method comprising:

- a. obtaining a default logical VPI/VCI address associated with the plurality
5 of network-side communications channels;
- b. defining a first plurality of unique logical VPI/VCI addresses based on a predefined set of rules for incrementing logical VPI/VCI addresses, each of the first plurality of unique logical VPI/VCI addresses associated with one of the plurality of user-side communications channels;
- 10 c. determining a second plurality of unique logical VPI/VCI addresses based on the default logical VPI/VCI address and the predefined set of rules;
- d. creating a plurality of cross-connects between the plurality of network-side communications channels and the plurality of user-side communications channels by linking the first and second unique logical VPI/VCI addresses.

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54. The method of claim 53, wherein each of the plurality of cross-connects are defined as being in an autoshutdown state.

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55. The method of claim 54, further comprising detecting a plurality of user ports, each of the plurality of user ports associated with one of a portion of the plurality of user-side channels.

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56. The method of claim 55, further comprising specifying one of the first and second plurality of unique logical VPI/VCI addresses as a base logical VPI/VCI address for each of a plurality of types of channels.

57. The method of claim 56, further comprising associating each type of channel for each user port with one of the first plurality of unique logical VPI/VCI addresses.

58. The method of claim 57, further comprising changing each of the plurality of cross-connects corresponding to each of the first plurality of unique logical VPI/VCI addresses associated with each type of channel for each user port to an up state.

- 5 59. A computer-readable medium having a computer program for use by an ATM switch for automatically configuring a plurality of cross-connects between a plurality of network-side communications channels and a plurality of user-side communications channels, the computer-readable medium comprising:
- a. a first portion of code for obtaining a default logical VPI/VCI address
10 associated with the plurality of network-side communications channels
 - b. a second portion of code for defining a first plurality of unique logical VPI/VCI addresses based on a predefined set of rules for incrementing logical VPI/VCI addresses, each of the first plurality of unique logical VPI/VCI addresses associated with one of the plurality of user-side communications channels;
 - 15 c. a third portion of code for determining a second plurality of unique logical VPI/VCI addresses based on the default logical VPI/VCI address and the predefined set of rules; and
 - d. a fourth portion of code for creating a plurality of cross-connects between the plurality of network-side communications channels and the plurality of user-side
20 channels by linking the first and second unique logical VPI/VCI addresses.

60. The computer-readable medium of claim 59, wherein each of the plurality of cross-connects are defined as being in an autodown state.

- 25 61. The computer-readable medium of claim 60, further comprising a fifth portion of code for detecting a plurality of user ports, each of the plurality of user ports associated with one of a portion of the plurality of user-side communications channels.

62. The computer-readable medium of claim 61, further comprising a sixth portion of code for specifying one of the first and second plurality of unique logical VPI/VCI addresses as a base logical VPI/VCI address for each of the types of channels.

5 63. The computer-readable medium of claim 62, further comprising a seventh portion of code for associating each type of channel for each user port with one of the first plurality of unique logical VPI/VCI addresses.

64. The computer-readable medium of claim 63, further comprising an eighth portion
10 of code for changing each of the plurality of cross-connects corresponding to each of the first plurality of unique logical VPI/VCI addresses associated with each type of channel for each user port to an up state.

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